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10/767,180	01/30/2004	Hideki Ishikawa	Q79126	4741

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EXAMINER	
VATHYAM, SUREKHA	

ART UNIT	PAPER NUMBER
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/767,180	ISHIKAWA ET AL.	
	Examiner	Art Unit	
	Surekha Vathyam	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/30/04 & 6/14/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figure 17 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see instant specification page 1, paragraph [0003] and page 5, paragraph [0029]). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "109" has been used to designate both "sensor element" and "second support member" in figure 10. Reference character "107" should be used to designate the "sensor element" to be consistent with the rest of the specification. Reference character "25" has been used to designate both "center portion" (page 6, line 16) and "protruded portion" (page 7, line 4).

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation regarding a second electrode "communicating exclusively with the atmosphere of the gas under

measurement" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities: Page 18, line 6, "7" should be changed to - -107 - -. Page 18, line 7, "17" should be changed to - -117 - -. Page 18, line 26, the word "FIGA." Should be changed to - -FIGS. - -.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1 – 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly, independent claims 1, 9 and 22 each recite the limitation "a second electrode disposed in contact with the second surface of the ion-conductive layer and communicating exclusively with the atmosphere of the gas under measurement". The specification makes reference to the first electrode in the atmosphere of the gas under measurement (page 7, lines 15 – 17) and the figures also depict the first electrode being in communication with the atmosphere of the gas under measurement. It is unclear if the claim inadvertently refers to the second electrode or if applicant actually is trying to claim something that is not otherwise described. For purpose of examination, the claim will be interpreted as "a first electrode disposed in contact with the first surface of the ion-conductive layer within the measurement chamber and communicating exclusively with the atmosphere of the gas under measurement, and a second electrode disposed in contact with the second surface of the ion-conductive layer".

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1 – 5, 9 – 11, 13 – 16, 18 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Beyer et al. (US 4,305,803).

Regarding claim 1, Beyer ('803) discloses a gas sensor (10) for measuring the concentration of a specific gas component in a gas under measurement (column 1, lines 8 – 12), comprising: a gas diffusion rate limiting portion (20, 28) limiting the rate of diffusion of the gas under measurement (column 3, lines 28 – 36 and column 4, lines 1 – 5); a measurement chamber communicating with an atmosphere of the gas under measurement through the gas diffusion rate limiting portion (see fig. 1); a sensor element (22) having an ion-conductive layer (17) with first and second surfaces (see fig. 1 and column 3, lines 39 – 41), a first electrode (16) disposed in contact with the first surface of the ion-conductive layer within the measurement chamber and communicating exclusively with the atmosphere of the gas under measurement (see fig. 1), and a second electrode (21) disposed in contact with the second surface of the ion-conductive layer; a cylindrical support member (11) installing therein the sensor element with the first and second surfaces of the ion-conductive layer directed toward front and base end sides of the support member, respectively (column 3, lines 46 – 52); and a circuit for applying a voltage between the first and second electrodes to cause dissociation, decomposition or reaction of the specific gas component of the gas in the

measurement chamber and thereby generates ions at the first electrode, allowing an electric current flow due to migration of the ions from the first electrode to the second electrode through the ion-conductive layer, and determining the concentration of the specific component in the gas under measurement based on the electric current flow (column 3, line 28 – 36 and column 3, lines 3 – 5).

Regarding claim 2, Beyer ('803) discloses the gas sensor further comprising: a gas introduction passage (13, 20, 28) for introducing the gas from the atmosphere of the gas under measurement to the first electrode (column 2, lines 5 – 10, column 2, lines 19 – 24, column 2, lines 66 – 67, column 3, lines 28 – 36 and column 4, lines 1 – 5); and a gas return passage for returning the gas drawn to the second electrode to the atmosphere of the gas under measurement (column 4, lines 27 – 30).

Regarding claim 3, Beyer ('803) discloses the gas sensor wherein the gas introduction passage leads to the measurement chamber from the front end side of the support member (column 4, lines 2 – 5 and column 4, lines 27 – 30).

Regarding claim 4, Beyer ('803) discloses the gas sensor wherein the gas return passage extends to the front end side of the support member (column 4, lines 27 – 30).

Regarding claim 5, Beyer ('803) discloses the gas sensor wherein the gas diffusion rate limiting portion is formed in the support member (see fig. 1 and column 3, lines 28 – 36 and column 4, lines 1 – 5).

Regarding claim 9, Beyer ('803) discloses a gas sensor (10) for measuring the concentration of a specific gas component in a gas under measurement (column 1, lines

8 – 12), comprising: a gas diffusion rate limiting portion (20, 28) limiting the rate of diffusion of the gas under measurement (column 2, lines 5 – 10, column 2, lines 19 – 24, column 3, lines 28 – 36 and column 4, lines 1 – 5); a measurement chamber communicating with an atmosphere of the gas under measurement through the gas diffusion limiting portion (see fig. 1); a sensor element (22) having an ion-conductive layer (17) with first and second surfaces (see fig. 1 and column 3, lines 39 – 41), a first electrode (16) disposed in contact with the first surface of the ion-conductive layer within the measurement chamber and communicating exclusively with the atmosphere of the gas under measurement, and a second electrode (21) disposed in contact with the second surface of the ion-conductive layer: first (11) and second (24) support members located on front and base end sides of the sensor element, respectively (see fig. 1), to support the sensor element between the first and second support members (column 1, line 66 – column 2, line 6 and column 3, lines 46 – 68); and a circuit for applying a voltage between the first and second electrodes to cause dissociation, decomposition or reaction of the specific component of the gas in the measurement chamber and thereby generate ions at the first electrode, allowing an electric current flow due to migration of the ions from the first electrode to the second electrode through the ion-conductive layer, and determining the concentration of the specific component in the gas under measurement based on the electric current flow (column 3, line 28 – 36 and column 3, lines 3 – 5).

Regarding claim 10, Beyer ('803) discloses the gas sensor further comprising: a gas introduction passage (13, 20, 28) for introducing the gas from the atmosphere of the

gas under measurement to the first electrode (column 2, lines 5 – 10, column 2, lines 19 – 24, column 2, lines 66 – 67, column 3, lines 28 – 36 and column 4, lines 1 – 5); and a gas return passage for returning the gas drawn to the second electrode to the atmosphere of the gas under measurement (column 4, lines 27 – 30).

Regarding claim 11, Beyer ('803) discloses the gas sensor wherein the gas introduction passage (13, 20, 28) has a gas introduction hole (13, 28) formed in the first support member such that the gas introduction passage leads to the measurement chamber from a front end side of the first support member (see fig. 1 and column 2, lines 5 – 10, column 2, lines 19 – 24, column 2, lines 66 – 67, column 3, lines 28 – 36 and column 4, lines 1 – 5).

Regarding claim 13, Beyer ('803) discloses the gas sensor wherein the gas diffusion rate limiting portion (20, 28) is formed in the first support member (column 3, lines 28 – 36, column 3, lines 46 – 52 and column 4, lines 1 – 5).

Regarding claim 14, Beyer ('803) discloses the gas sensor wherein the first support member (11) is formed into a cylindrical shape (column 2, lines 60 – 68) and installs therein the sensor element (column 3, lines 46 – 52) and optionally the second support member (column 3, lines 52 – 68).

Regarding claim 15, Beyer ('803) discloses the gas sensor wherein the first support member (11) is mainly made of a ceramic material (column 2, lines 60 – 62).

Regarding claim 16, Beyer ('803) discloses the gas sensor wherein the first support member (11) has an electrically conductive portion (15) connected to the first electrode (16) (see fig. 1 and column 3, lines 3 – 9).

Regarding claim 18, Beyer ('803) discloses the gas sensor further comprising an elastic member pushing the second support member and the sensor element to the first support member (see fig. 1 and column 3, lines 52 – 68).

Regarding claim 22, Beyer ('803) discloses a gas sensor (10) for measuring the concentration of a specific gas component in a gas under measurement (column 1, lines 8 – 12), comprising: a gas diffusion rate limiting portion (20, 28) limiting the rate of diffusion of the gas under measurement (column 3, lines 28 – 36 and column 4, lines 1 – 5); a measurement chamber communicating with an atmosphere of the gas under measurement through the gas diffusion limiting portion (see fig. 1); a sensor element (22) having an ion-conductive layer (17) with first and second surfaces (see fig. 1 and column 3, lines 39 – 41), a first electrode (16) disposed in contact with the first surface of the ion-conductive layer within the measurement chamber and communicating exclusively with the atmosphere of the gas under measurement, and a second electrode (21) disposed in contact with the second surface of the ion-conductive layer: means for supporting the sensor element (11) in such a manner the first and second surface of the ion-conductive layer are directed toward front and base ends of the gas sensor, respectively (column 3, lines 46 – 52); and a circuit for applying a voltage between the first and second electrodes to cause dissociation, decomposition or reaction of the specific component of the gas in the measurement chamber and thereby generate ions at the first electrode, allowing an electric current flow due to migration of the ions from the first electrode to the second electrode through the ion-conductive layer, and

determining the concentration of the specific component in the gas under measurement based on the electric current flow (column 3, line 28 – 36 and column 3, lines 3 – 5).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (US 4,305,803) in view of Ohtsuki et al. (US 6,296,748).

Beyer ('803) discloses the gas sensor as discussed above with regards to each of independent claims 1 and 9. Regarding each of dependent claims 6 and 19, Beyer ('803) discloses the gas sensor further comprising a filter (29, 27) having air permeability arranged between the gas diffusion rate limiting portion and the atmosphere of the gas under measurement (see fig. 1 and column 2, lines 19 – 28 and column 4, lines 2 – 26). Beyer ('803) does not expressly disclose the filter having water repellency.

Ohtsuki ('748) teaches a gas sensor comprising a filter (53) having water repellency and air permeability (column 6, lines 27 – 32).

It would have been obvious to one of ordinary skill in the art to modify the gas sensor of Beyer ('803) to include a filter that has water repellency as taught by Ohtsuki ('748) because the filter blocks liquids such as water from passing through the gas introduction passage but allows a gas that needs to be measured to pass through as explained by Ohtsuki ('748) (column 6, lines 8 – 41).

14. Claims 7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (US 4,305,803) in view of Nishizawa et al. (US 4,795,544).

Beyer ('803) discloses the gas sensor as discussed above with regards to each of independent claims 1 and 9. Regarding each of dependent claims 7 and 20, Beyer ('803) discloses the gas sensor comprising an ion-conductive layer (17) that measures

the concentration of a test gas (see abstract and column 1, lines 8 – 12). Beyer ('803) does not explicitly disclose the ion-conductive layer being proton-conductive.

Nishizawa ('544) teaches a gas sensor for measuring a component in a gaseous fluid using solid electrolyte layers (column 1, lines 7 – 13) wherein the solid electrolyte layers are made of known ion-conductive solid electrolyte materials which could be oxygen-ion conductors to measure oxygen concentration or proton conductors to measure hydrogen concentration in a gas sample (column 10, lines 8 – 16 and column 11, lines 5 – 16).

It would have been obvious to one of ordinary skill in the art to have used a proton-ion conductor as taught by Nishizawa ('544) in the gas sensor of Beyer ('803) because as Nishizawa ('544) explains the gas sensor can be adapted to detect the concentration of hydrogen by using a proton ion-conductor (column 10, lines 8 – 16 and column 11, lines 5 – 16).

15. Claims 8, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (US 4,305,803) in view of Kawatsu (US 5,897,766).

Beyer ('803) discloses the gas sensor as discussed above with regards to each of independent claims 1, 9 and 22. Regarding each of dependent claims 8, 21 and 22, Beyer ('803) discloses the gas sensor is designed to detect gas content in exhaust gases from internal combustion engines (column 1, lines 8 – 12) and comprises a tube (11) (column 2, lines 54 – 66) through which the gas under measurement flows (column

4, lines 27 – 30). However, Beyer ('803) does not expressly state the gas sensor is designed to be fixed to a pipe through which the gas under measurement flows.

Kawatsu ('766) teaches a gas sensor (1) that is designed to be fixed to a pipe (40) through which the gas under measurement flows (column 13, lines 35 – 41).

It would have been obvious to one of ordinary skill in the art to modify the gas sensor of Beyer ('803) to be fixed to a pipe such as the gaseous fuel conduit (40) taught by Kawatsu ('766) because it enables the detection of concentration of a gaseous component in a supply of gaseous fuel.

16. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (US 4,305,803).

Beyer ('803) discloses the gas sensor as discussed with regards to claim 10 above. Regarding claim 12, Beyer ('803) does not explicitly disclose the gas return passage including: a first gas return channel extending laterally outwardly in the second support member; and a second gas return channel connected with the first gas return channel and extending to a front end side of the first support member.

Beyer ('803) however discloses on column 4, lines 28 – 30, "The tube 11 may, even, be formed with a communication opening for the test gas, to communicate the inside with the outside". This would have suggested the structure recited for the gas return passage to one of ordinary skill in the art.

Allowable Subject Matter

17. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim. Beyer ('803) does not disclose or render obvious the further limitations upon the second support member required by claim 17, at least two ceramic layers laminated to each other, a front end electrode arranged at a front end side of the second support member; a base end electrode arranged at a base end side of the second support member; at least one electrically conductive layer, each of which is arranged between adjacent two of the ceramic layers; and through holes formed in the respective ceramic layers so as to allow offset therebetween and to provide electrical connection between the front and base end electrodes through said at least electrically conductive layer, in combination with the limitations of the base claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Surekha Vathyam whose telephone number is 571-272-2682. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SV/
May 25, 2007

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